

INSIDE DOS

Tips & techniques for MS-DOS & PC-DOS Versions 5 & 6

Disk caching with SMARTDrive improves system performance

VERSIONS
5.0 & 6.0

If there's a single common factor all computer users want from their systems, it's speed. The faster our computers run, the faster we can get our work done. The expensive way to fulfill this desire is to buy hardware that runs at lightning speed. Unfortunately, many of us aren't lucky enough to afford that luxury. A less expensive, but still potentially costly, alternative is to buy software that improves system performance. But before you spend money on more speed, check out the SMARTDrive utility. SMARTDrive can make your system operate ten times faster than the effective speed of your hard disk.

What is SMARTDrive?

SMARTDrive is a disk-caching utility included with DOS and Windows. Disk caching is a process whereby the most recent information read from or, in some cases, written to a disk is temporarily held in a buffer, or *disk cache*, in RAM (random-access memory). If a program requests the information, the disk cache delivers it, thus avoiding another disk access. Since RAM operations execute much faster than disk operations, each disk cache retrieval saves you time.

Right now, five versions of SMARTDrive exist:

- Version 3.0 comes with Windows 3.0.
- Version 3.1 comes with DOS 5.
- Version 4.0 comes with Windows 3.1.
- Version 4.1 comes with DOS 6.
- Version 4.2 is available from the Microsoft Download Service (BBS) and with the DOS 6.2 maintenance release.

The version you should use depends on what is available to you and what your needs are. Let's take a close look at each.

SMARTDrive 3.0

In Windows 3.0, SMARTDrive 3.0 is a device driver called SMARTDRV.SYS. This version supports read caching but not write caching (it temporarily stores

information read from the disk but not written to it) for both Windows and DOS. It can cache hard disks but not floppy disks, and it can't run in conjunction with other disk-caching utilities. In addition, because of the way this version caches drives, 3.0 isn't compatible with Bernoulli drives, hard cards, and some SCSI (Small Computer System Interface) drives. However, using this version of SMARTDrive, you can establish a disk cache in extended or expanded memory. SMARTDRV.SYS uses at least 17 Kb of conventional memory.

The Windows 3.0 Setup program automatically installs SMARTDrive 3.0 by adding a DEVICE directive to your CONFIG.SYS file:

```
DEVICE=c:\windows\smartdrv.sys normalsize minsize
```

This line creates a disk cache in extended memory. To create a disk cache in expanded memory, you can open the CONFIG.SYS file and add the /A switch to this line.

The *normalsize* parameter specifies how much memory, in kilobytes, Windows sets aside for the disk cache. The *minsize* parameter sets a limit on how small your system can shrink the disk cache, should Windows require some of the RAM the cache is using.

SMARTDrive 3.1

In DOS 5, SMARTDrive 3.1 is a modified version of Windows 3.0's SMARTDRV.SYS. Like the Windows 3.0 version, this version supports read caching but not write

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caching, can cache hard disks but not floppy disks, and can establish a disk cache in extended or expanded memory. (Read "Extended or Expanded Memory?" below to help you decide which type to use.)

You install SMARTDrive 3.1 in your CONFIG.SYS file by using the DEVICE or DEVICEHIGH directive:

```
DEVICE=c:\dos\smartdrv.sys maxsize minsize
```

This line creates a disk cache in extended memory. To create a disk cache in expanded memory instead, add the /A switch.

If the SMARTDRV.SYS file is in a directory other than the DOS directory, make sure you modify the path accordingly. The *maxsize* parameter specifies how much memory, in kilobytes, you want to set aside for the disk cache. The *minsize* parameter sets a limit on how small your system can shrink the disk cache, should another program require some of the RAM the cache is using.

Extended or expanded memory?

Whether you're using Windows 3.0's SMARTDrive 3.0 or DOS 5's SMARTDrive 3.1, it's a good idea to set up a disk cache in extended memory whenever possible. As you'll see, however, doing so isn't always possible.

Disk caching in extended memory

If you have a 286, 386, or 486 PC, you can use extended memory to establish a disk cache. To function effectively,

the disk cache needs at least 256 Kb of memory. Its effectiveness increases as the amount of memory you allocate increases. For instance, if you have 1 Mb of memory (640 Kb of conventional memory plus 384 Kb of extended memory), you might be able to use only 256 Kb for your disk cache. If you have 2 Mb or more of memory, a disk cache of 1 Mb (*normalsize* or *maxsize*=1024) will serve you well.

In order for SMARTDrive to create a disk cache in extended memory, you must precede the line that installs SMARTDrive in CONFIG.SYS with a line that installs the HIMEM.SYS device driver:

```
DEVICE=c:\dos\himem.sys
```

SMARTDrive uses HIMEM.SYS to access extended memory without overwriting or conflicting with other programs or drivers that use extended memory.

Disk caching in expanded memory

If you use expanded memory with a 286, 386, or 486, you can set up a disk cache in expanded memory instead of extended memory. However, if you use an 8086 or an 8088, you *must* use expanded memory to set up a SMARTDrive disk cache, since these machines don't provide extended memory.

If you use the EMM386 driver to emulate expanded memory in extended memory on a 386 or 486, you can set up a disk cache in the emulated expanded memory. However, you're better off setting up the cache in extended

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memory, since your system can access that cache faster than it can a cache set up in emulated expanded memory.

In order for SMARTDrive to establish a disk cache in expanded memory, you must precede the directive that installs SMARTDrive with one that installs an expanded memory manager (EMM). Usually, the expanded memory board comes with the EMM you need to install.

SMARTDrive 4.0

In Windows 3.1, SMARTDrive 4.0 is an executable file called SMARTDRV.EXE that the AUTOEXEC.BAT file runs. In addition to read caching, this version offers write caching and supports caching of floppy drives. Unlike earlier versions of SMARTDrive, this version works with almost any drive, including Stacker compressed drives. However, you can't run SMARTDrive 4.0 with DOS 6's DoubleSpace installed. Finally, SMARTDrive 4.0 can use only extended memory, not expanded memory.

When you install Windows 3.1, Setup adds the line

```
c:\windows\smartdrv.exe
```

to your AUTOEXEC.BAT file. By default, this line enables read and write caching for the hard drive but only read caching for floppy disks. To change the caching specifications, you modify this line using the format

```
c:\windows\smartdrv.exe drive1[sign] drive2[sign]... size
switches option switches
```

where *drivex* is the drive you want to cache and *[sign]* is + (to enable both read and write caching), - (to completely disable caching), or blank (to enable just read caching). The *size switches* can be any combination of the choices in Table A, listed in that order, and the *option switches* can be any of the choices in Table B.

SMARTDrive 4.1

In DOS 6, SMARTDrive 4.1 is a version almost identical to Windows 3.1's 4.0 version. Like the 4.0 version, 4.1 supports read and write caching as well as caching of floppy drives, works with almost any drive, and can use only extended memory. One important difference is that 4.1 will function in conjunction with DoubleSpace.

Table A: SMARTDrive size switches

Switch	Description
/E: <i>element size</i>	Designates how much data SMARTDrive moves between the cache and the drive at one time. The <i>element size</i> represents the data size, in bytes; it can be any power of 2 as long as it's greater than 1 (2, 4, 8, 16, etc.). The default value of the <i>element size</i> is 8192 (8 Kb).
/B: <i>buffer size</i>	Designates how much additional data SMARTDrive reads to the cache during a read operation. The <i>buffer size</i> represents the data size, in bytes; it can be any multiple of the <i>element size</i> . The default value of the <i>buffer size</i> is 16384 (16 Kb).
<i>initial size</i>	Designates the size of the cache, in kilobytes, before Windows starts running. The default value can be as large as 2048 (2 Mb) but will vary according to how much extended memory you have.
<i>windows size</i>	Designates the minimum size, in kilobytes, SMARTDrive can shrink the cache. The default value will vary according to how much extended memory you have.

Table B: SMARTDrive option switches

Switch	Description
/C	Forces SMARTDrive to immediately write to the disk any information cached from a write operation.
/L	Loads SMARTDrive into conventional memory.
/Q	Suppresses SMARTDrive's startup information.
/R	Empties the disk cache and restarts SMARTDrive.
/S	Displays a SMARTDrive status report.

You run SMARTDrive 4.1 from your AUTOEXEC.BAT file by using the command

```
c:\dos\smartdrv
```

(If the SMARTDRV.EXE file is in a directory other than the DOS directory, make sure you modify the path accordingly.) This line creates a disk cache in extended memory and enables read and write caching for the hard drive but only read caching for floppy disks.

To change the caching specifications, you modify this line by using a syntax similar to the one SMARTDrive 4.0 uses:

```
c:\dos\smartdrv.exe drive1[sign] drive2[sign]... size  
switches option switches
```

Again, *drivex* is the drive you want to cache and *[sign]* is + (to enable both read and write caching), - (to completely disable caching), or blank (to enable just read caching). The available *size switches* and *option switches* are those in Tables A and B, respectively.

Write caching pros and cons

Write caching temporarily stores data in RAM before writing the data to the disk drive. Doing so allows SMARTDrive to wait until it detects a drop in the demand on your system's resources before it writes the data to the drive.

Without write caching, applications that frequently write data to the hard drive can take serious performance hits, since they're always waiting for the hard drive to complete the previous write operation. Therefore, delaying disk writes to a time when the load on your system's resources is light can provide a huge increase in performance.

However, SMARTDrive 4.0 will hold the data in its write cache for a maximum of only five seconds. Once the five seconds is up, SMARTDrive writes the data to the drive regardless of the load on your system's resources.

In addition, SMARTDrive prevents the loss of information by automatically writing the cache contents to disk anytime one of the following conditions occurs:

- A program calls the BIOS (basic input/output system) to perform a disk reset, as Windows does when it terminates.
- The cache is full.
- Your system is idle.
- You press [Ctrl][Alt][Del] to reboot.

Unfortunately, this safeguard won't prevent the loss of information in the cache if you press your computer's Reset button, turn off your computer, pull the plug, or

Downloading SMARTDrive 4.2

VERSION
6.0

In "Disk Caching with SMARTDrive Improves System Performance," which begins on page 1, we describe the benefits each version of SMARTDrive offers. As we mention in that article, the latest version of SMARTDrive is available in the maintenance release of DOS, Version 6.2. However, if you don't plan to upgrade to Version 6.2 or if you don't want to wait until you upgrade to get the benefits of SMARTDrive 4.2, you can obtain this version of SMARTDrive from the Microsoft Download Service bulletin board.

To obtain SMARTDrive from Microsoft Download, start by changing your communications settings to

- 8 data bits
- even, odd, or no parity
- 1 stop bit
- any speed up to 9600 baud

Next, dial (206) 936-6735.

The first prompt will ask you to enter your full name. The next prompt will ask you for your city and state. At the verification prompt, press Y if the displayed information is correct.

Next, some preliminary information will appear. At the bottom of each screenful, you'll see *-More- or -Press Any Key-*. To continue viewing the information, press a key. To skip the remaining information, press S.

Once you've finished viewing the preliminary information, you'll see the Microsoft Download Service Main Menu. At the *Command:* prompt, press D to select [D]ownload File from this list. When you do, another list of options appears. Now press D, followed by [Enter], to select <D>ownload. The prompt *File Name?* will appear. At this prompt, type *PD0805.EXE* and press [Enter].

Microsoft Download will search for this file in each of its file areas. When it finds the file, a list of download protocols appears. Select one that your modem supports and then issue the command from your communications software menu to begin downloading. After downloading is complete, press the [Enter] key to return to the Main Menu; then, press E to log off the bulletin board.

experience a power failure. If you turn off your computer immediately after quitting Windows, you might lose information then as well. And if you've enabled write caching for a floppy drive, you might lose data by removing a diskette before SMARTDrive writes the cached data to it.

To ensure that SMARTDrive writes important data to disk, flush the write cache by using the command

```
C:\>smartdrv /c
```

before powering down your system. As the cache flushes, the disk light will flash. Once the light stops flashing, you can safely shut off the computer.

In addition to flushing the cache before you manually power down, remember to flush it in batch files that reboot the system. To do so, simply include the SMARTDRV /C command before the line that calls for a reboot.

SMARTDrive 4.2

The latest version of SMARTDrive (4.2) offers an alternative to DOS users who want

- more conservative disk caching
- default write-cache flushing
- a switch to easily disable all write caching

By default, this version of SMARTDrive writes the contents of the write cache to disk after completing a DOS command or exiting a DOS program or DOS-based application. In doing so, Version 4.2 provides better protection from data loss than previous versions of SMARTDrive.

For users who want to override this default, the new /N switch prevents automatic write-cache flushing. With the /N switch, write-cache flushing occurs as it did in Versions 4.0 and 4.1.

For users who don't want write caching at all, the new /X switch completely disables the write-caching feature for all drives. With the /X switch, only read caching is enabled.

The main drawback of this version is slower disk-write performance. (Read the article "Downloading SMARTDrive 4.2" below to find out how you can obtain this version of SMARTDrive from the Microsoft Download Service.)

Conclusion

Whether you use DOS 5 or DOS 6—with or without Windows 3.0 or 3.1—you can improve your system's performance by installing the SMARTDrive utility. SMARTDrive offers a much more cost-effective alternative to high-speed hardware or system-optimization software. ■

PD0805.EXE is a self-extracting file containing SMARTDRV.EXE (SMARTDrive, Version 4.2), SMARTDRV.TXT (an instructional text file), and README.TXT (technical notes for SMARTDrive). Once you've downloaded PD0805.EXE, create a temporary directory and then type

```
C:\>pd0805 c:\tempdir
```

where *tempdir* is the temporary directory you just created. This command explodes the files in PD0805.EXE and stores them in the temporary directory.

Now, if you aren't sure you want to replace your current version of SMARTDrive with Version 4.2, don't delete the current version just yet. Instead, locate in your AUTOEXEC.BAT file the line

```
c:\dos\smartdrv
```

or

```
c:\windows\smartdrv.exe
```

which installs SMARTDrive. Replace the line with

```
c:\tempdir\smartdrv
```

Then, press [Ctrl][Alt][Del] to reboot your computer and install SMARTDrive 4.2.

If you decide to keep this version, copy the SMARTDRV.EXE file in the *tempdir* directory to the C:\DOS directory and replace the line

```
c:\tempdir\smartdrv
```

in your AUTOEXEC.BAT file with the line

```
c:\dos\smartdrv
```

Then, reboot your computer again.

If you decide to keep your original version of SMARTDrive, issue the command

```
C:\>deltree c:\tempdir
```

to remove the *tempdir* directory and all the files associated with SMARTDrive 4.2. Then, replace the line

```
c:\tempdir\smartdrv
```

in your AUTOEXEC.BAT file with the line that loaded your original version of SMARTDrive. Finally, reboot your computer again.

Who knows things about your system that you don't? MSD, that's who

Have you ever called for technical assistance with a program or piece of hardware and been asked a question you couldn't answer, such as "Whose mouse driver are you using?" or "Are you using Version 3 of XMS?" Or perhaps this has happened to you: Your system refuses to work properly. You discover there's a battery in it that maintains a small area of memory (called CMOS). When you replace the battery and restart the system, it asks you what type of hard disk you have—and you don't know.

DOS includes a little-known program that answers all these questions and more. Called MSD, this program tells you far more than you'll ever want to know about the inner workings of your system. However, it's just the sort of information technical support people often need. MSD is simple to run, and it even lets you print page after page of its reports. Keep a copy of those reports on hand, and you'll have the information available even when your system won't run.

We've lost touch with our hardware

Most systems today come with all the hardware installed and checked out; often the software, too, is copied onto the hard disk and ready to run. This is a relief compared to the trial by ordeal we often faced just a few years ago to get all the pieces of hardware and software talking to each other. But there's a downside to this convenience: We simply don't know as much about what's in our system as we once might have. That's fine as long as things run smoothly, because we bought a computer to help us with our work, not to learn how it works.

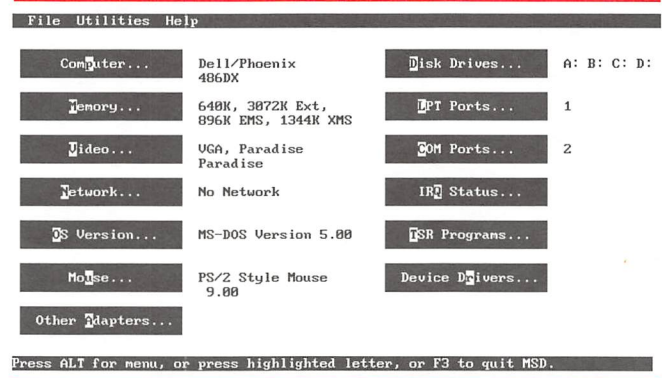
But things don't always run smoothly. Hardware isn't immortal. And even if our system runs without a hitch, we often add hardware or software that requires some knowledge of what's inside our PCs. The usual source of information is the documentation, but the manual—if there is a manual—may or may not have the information we need; even if the information is there, sometimes it's so artfully hidden that finding it is an unwanted adventure.

MSD is a diagnostic program that checks out your system—all of your system, including memory, disk drives, processor, ports, video card, network, mouse—the whole thing. MSD displays reports filled with wonderful details about all these system components. You won't need MSD very often—if you're exceptionally lucky you may *never* need it—but when you do, you'll need it badly, and you'll need it right away.

Another utility program

Following the same naming convention as MSAV (Microsoft Anti-Virus), the *MS* in MSD is for *Micro*soft and the *D* is for *Diagnostics*. MSD's program file, MSD.EXE, is in the DOS directory; to start MSD, just type *msd*. The program flashes the message *MSD is examining your system...* and then displays its main screen, shown in Figure A.

Figure A



The MSD main screen offers 13 report choices.

Like the other utilities DOS includes, MSD is a separate program with its own mouse-and-menu interface. The MSD screen offers three menus—File, Utilities, and Help—and 13 options for reports to view (Computer... through Device Drivers...).

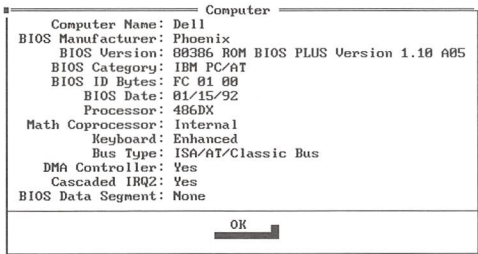
To the right of each option is a brief description of the information, if any, that MSD found in that area of your system. Next to Computer..., for example, the top line tells you the name of the computer manufacturer (which may or may not be correct) and the name of the company that provided the ROM BIOS; the second line shows the type of processor and math coprocessor, if any, in your system.

The first number beside Memory... represents the amount of conventional memory available on your computer, most likely 640K. The second number, separated from the first by a comma or a slash, is the amount of extended memory. If your system has 2 Mb of memory, you'll probably see 1024K Ext; if your system has 4 Mb of memory, you'll probably see 3072K Ext.

In addition to the brief descriptions on the main screen, MSD can provide a lot more detail. For example, if you choose Computer... (either by pressing P, the highlighted letter, or by clicking Computer... with the

mouse), MSD displays the Computer report, shown in Figure B.

Figure B



The MSD Computer report reveals technical details about your system.

Much of what you'll see is information only a technician could love (or even want), but on the rare occasions you need it, you'll be delighted you can access it so easily. To clear the Computer report from the screen, press [Esc].

How's your memory?

Some of MSD's features are more immediately useful than others. To view one example, choose the option TSR Programs... (the next-to-last choice). When you do, MSD displays the TSR Programs report, shown in Figure C. The left column shows the name of a memory-resident program or DOS feature, the second column shows the address in memory where the item is located (the address is a hexadecimal number), and the third column shows the amount of memory (in bytes) that the item takes up.

Figure C

TSR Programs			
Program Name	Address	Size	Command Line Parameters
System Data	025B	12816	
HIMEM	025D	1184	XMSXXXXB
EMM386	02A0	9424	EMMXXXXB
File Handles	04F6	896	
FCBS	052F	256	
BUFFERS	0540	512	
Directories	0561	448	
System Code	057D	64	
COMMAND.COM	0582	2368	
Free Memory	0617	64	
COMMAND.COM	061C	512	
HKTRAP.EXE	063D	176	
HKTRAP.EXE	0649	24248	
HKTRAP.EXE	0C35	1856	
SNAP.EXE	0C78	176	
SNAP.EXE	0C84	185728	
OK			

The TSR Programs report gives you information you can use without the help of a technician.

Check the Size entry for File Handles and FCBS (around the fourth and fifth lines of the report). These numbers tell you how much of your system's memory the FILES and FCBS commands in your CONFIG.SYS file reserve. You may be using more memory than you

need for these items, especially if you installed and then discarded a program that required a lot of files (the program may have changed your CONFIG.SYS file when you installed it).

If the File Handles are consuming much more than 2,000 bytes of memory, change the FILES command in CONFIG.SYS to FILES=40 or even FILES=30; then, restart your system. If a program fails to run properly after the change, increase the number a bit and try again. You'll save about 50 bytes of memory for every file you reduce.

You can do the same with FCBS. If FCBS takes up more than 80 bytes, change the FCBS command in CONFIG.SYS to FCBS=1 and see how things run. As with the FILES command, if a program doesn't run properly, increase the number and try again. Press [Esc] or click OK to clear the TSR Programs report from the screen.

The MSD menus

The menus at the top of the MSD screen help you get the most out of the information MSD gathers. For instance, display the File menu either by pressing [Alt]F or clicking File with the mouse. The File menu includes choices that let you find any file in your system, print the MSD reports instead of displaying them, display any of the system files listed in the menu, or leave MSD. These functions duplicate capabilities available through DOS commands or the DOS Shell but could prove helpful while you're using MSD.

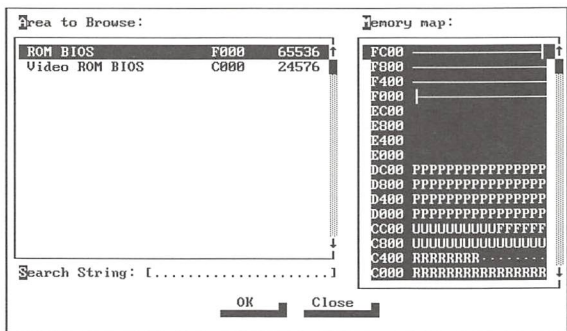
The Find File... option lets you search for any file on any drive. When Find File... locates the file, it displays the name, size, and date from the directory entry and gives you the option of displaying more information about the file or displaying the file itself. Print Report... lets you choose which MSD reports to print and where to print them. Choosing any of the files listed on the menu displays the file.

Now press → to display the Utilities menu. This menu contains some functions of interest mostly to technicians. Memory Block Display... shows where in memory your programs, buffers, file control blocks, and so forth are located. This item displays both addresses and sizes as well as a graphic map of memory. A quick tour through the items listed here provides a good picture of what's in your system.

The Memory Browser... option on the Utilities menu lets you scan three different areas of ROM (read-only memory) for a word or phrase. To see an example, choose Memory Browser... to open the dialog box shown in Figure D on page 8. Then, tab to the Search String field or click the mouse in this field, type disk, and press [Enter]. When you do, MSD displays several phrases containing the word diskette or disk, as shown in

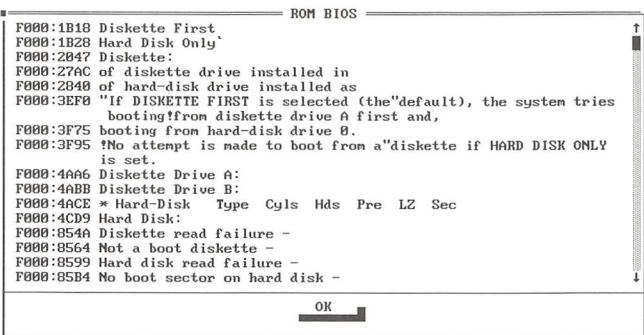
Figure E. Each entry begins with the address in ROM where the phrase resides. Since there's more than one screenful of phrases, you can scroll with the mouse or press the [PgDn] key to view additional screens.

Figure D



The Memory Browser... option lets you search for a word or phrase in ROM.

Figure E



When you specify a search string, Memory Browser lists the addresses in ROM where it locates the string.

The Utilities menu's Insert Command... option lets you insert one of three fixed commands into CONFIG.SYS or AUTOEXEC.BAT. However, you can't otherwise edit the files, so this isn't an especially useful function. Test Printer... prints a sample page on your printer, and Black & White switches your display back and forth between color and monochrome.

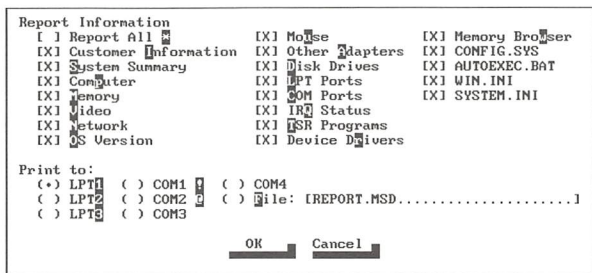
Taking a snapshot of your system

After you've cruised around MSD for a while, do yourself a favor before ending the program: Take a snapshot of the information by printing a report. To do so, choose Print Report... from the File menu. MSD will display a dialog box, shown in Figure F, that lets you choose which items you want to print.

Some of the reports are certainly more useful than others, but you never know which ones you'll need,

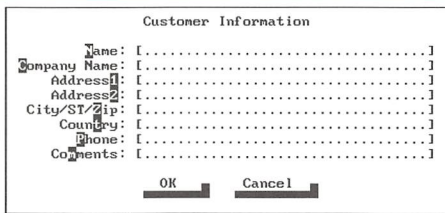
so select Report All * (the first item under Report Information). At the bottom of the dialog box, select the port to which your printer is attached—probably LPT1—and then choose OK. If the Customer Information dialog box shown in Figure G appears, enter any relevant information and again choose OK.

Figure F



By issuing the Print Report... command, you can print selected MSD reports.

Figure G



The Customer Information dialog box lets you specify whom the MSD report is for.

You'll wind up with eight or more pages of output. Staple the pages together and file them where you'll be able to find them. If you add some hardware to your system, reprint the appropriate report (or reprint all of them and toss the old ones). You won't need this information very often, but when you do, you'll be delighted to be able to haul the reports out of a drawer, especially if your system won't run at all. It's a cheap form of insurance.

Oh, and by the way, the Mouse report tells you whose mouse driver you're using, the Disk Drives report tells you what type of hard disk you have, and the Memory report tells you what version of XMS you're using. Print a complete MSD report now. ■

Contributing editor Van Wolvert is the author of the best-selling books *Running MS-DOS 5* and *Supercharging MS-DOS*. Van, who has worked for IBM and Intel, currently lives in Albertain, Montana.

Survey says ...

In the August issue of *Inside DOS*, we asked you to help us get to know you better so we can tailor the journal to meet your needs. We thank everyone who took the time to respond. Your feedback is important to us as we continue to plan future issues. To give you some idea of what to expect, here's how you responded to our survey and what we plan to do to provide you with information you can use.

DOS USER PROFILE

1. How would you rate your familiarity with DOS?

Novice: 15% Experienced: 72% Expert: 12%

Most of you feel you're experienced with DOS, so we'll continue to focus the majority of our articles on intermediate-level subjects with occasional features on basics as well as more advanced topics.

2. How would you rate your proficiency with batch files?

Novice: 35% Experienced: 59% Expert: 6%

While the majority of you have experience with batch files, a significant number still feel relatively new to them. In light of this, we'll continue to explain each command in the batch files we publish to ensure your comfort and understanding of how our batch files work.

3. How would you rate your proficiency with QBasic?

Novice: 86% Experienced: 12% Expert: 2%

A large number of you feel inexperienced with QBasic. In addition, only about 25% would like to see articles on QBasic. For that 25%, we'll publish an occasional article involving QBasic, and we'll be sure to address the issue from a beginner's point of view.

4. Do you use the DOS Shell?

Never: 48% Sometimes: 39% Often: 13%

About half of you never use the DOS Shell while the other half use it at least sometimes. For those who do, we'll continue to publish useful Shell tips. However, since DOS 6.2 no longer includes the DOS Shell, we may not give the Shell as much attention as we have in the past.

5. Do you use Windows?

Never: 30% Sometimes: 29% Often: 41%

Seventy percent of you use Windows at least sometimes, and 52% said you want to see articles on Win-

dows. However, 20% of you also subscribe to *Inside Microsoft Windows*, a Cobb Group publication that provides tips and techniques for Windows users. Therefore, we'll publish some tips relating DOS to Windows, but we'll try to minimize the topic overlap between the two journals.

6. Do you use third-party utilities?

Never: 11% Sometimes: 49% Often: 40%

Although reviews of third-party utilities haven't appeared in *Inside DOS* often in the past, the vast majority of you indicated that you use third-party utilities at least some of the time. In addition, a significant number expressed interest in seeing reviews of DOS utilities in the journal. Look for more reviews in future issues.

7. Have you updated to DOS 6.0?

Yes: 50% Plan to: 25% Don't plan to: 25%

Since 75% of you have upgraded to DOS 6 or plan to do so, we'll continue to spotlight articles on making the most of DOS 6's new features. For those who plan to stay with DOS 5, we'll try to provide a comparable technique to any exclusively DOS 6 technique we publish. The majority of our articles will feature tips and techniques that users of both versions can benefit from.

8. Do you take advantage of MemMaker in DOS 6?

Yes: 32% No: 18% N/A

Of the 50% who have already upgraded to DOS 6, almost two-thirds of you take advantage of the MemMaker utility. Although we don't know all the reasons the other third doesn't, we feel that occasional discussions of MemMaker will benefit current and future DOS 6 users.

9. Do you use DoubleSpace in DOS 6?

Yes: 20% No: 30% N/A

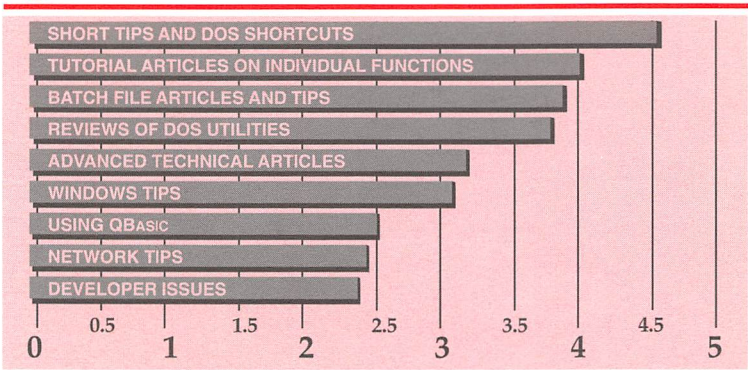
Forty percent of you who have upgraded to DOS 6 use DoubleSpace compression, while 60% of you don't. Of that 60%, a number of you indicated you experienced problems when trying to use DoubleSpace. Many of you indicated that you use a third-party disk compression utility instead. Although DoubleSpace won't be a hot topic in future issues, we'll highlight the improvements in DOS 6.2's DoubleSpace.

JOURNAL TOPICS

10. Tell us what kinds of articles you'd like to see (with 1 indicating those you least want and 5 those you most want).

As Figure A shows, the article type you showed the greatest preference for is short tips and DOS shortcuts. You also indicated an interest in tutorial articles, batch file tips, and reviews of DOS utilities. Therefore, we'll

Figure A



Short tips and DOS shortcuts topped the list of article topics you'd like to see.

give these topics priority coverage in future issues. Since QBasic, network tips, and developer issues drew little interest, you won't see many articles on those topics.

In addition to the listed article types, some of you suggested articles on specific subjects, such as

- memory management
- DOS basics
- DEBUG
- DOS Shell
- undocumented DOS features
- printing from DOS
- system optimization
- workarounds to DOS' shortcomings
- error message interpretation
- version upgrade critiques
- warnings about potentially destructive features
- file security
- hardware selection

This list provides us with useful input as we continue developing future articles for *Inside DOS*.

Table A: Other Cobb Group publications you read

Readers	Publication	Readers	Publication
20%	Inside Microsoft Windows	1%	Inside Visual Basic for Windows
12%	Inside WordPerfect		Inside Norton Desktop for Windows
5%	Inside PC Tools		Inside Quattro Pro for Windows
	Inside NetWare		The WordPerfectionist
	1-2-3 User's Journal		Inside Works for Windows
4%	Inside Quattro Pro		Inside Paradox for Windows
	The DOS Authority		Inside PC Tools for Windows
3%	Inside dBASE		Microsoft C/C++ Developer's Journal
	Inside Word for Windows	<1%	Cobb Group reference books
	Paradox User's Journal		Inside Microsoft Works
	Inside 1-2-3 Release 3		Inside Turbo Pascal
2%	The Expert		Paradox Developer's Journal
	DOS Software Connection		The MacAuthority
	Inside WordPerfect for Windows		Windows Software Connection
	Inside Microsoft Basic		Excellence
	Inside Word		FoxPro Developer's Journal
	The Inside Word		Inside AutoCAD
	The Workshop		Inside Filemaker Pro
	Inside Microsoft Access		Inside HyperCard
	Inside OS/2		Inside Microsoft Access Resource Disk
			Inside Turbo C++
			Inside Word for Windows Software Connection
			WordPerfect Software Connection

YOUR COMPUTER

11. What kind of CPU do you have?

286: 7% 386: 41% 486: 52%

12. How much RAM do you have?

4 Mb: 43%
5 to 8 Mb: 39%
More than 8 Mb: 18%

13. What kind of video display do you have?

EGA: 2% VGA: 43%
SuperVGA: 51% Other: 4%

14. How big is your hard drive?

Less than 40 Mb: 5%
40 to 100 Mb: 62%
100 to 400 Mb: 24%
Greater than 400 Mb: 8%

15. What kind of printer(s) do you use?

Dot-matrix: 39% Laser: 22%
Both: 34% Other: 5%

16. Do you use a mouse or other pointing device?

Yes: 87% No: 13%

17. Are you running DOS from a network?

Yes: 15% No: 85%

The average computer system, based on your responses, is a standalone 486 with 4 Mb of RAM, a 40-to-100-Mb hard drive used with a SuperVGA display, a mouse or other pointing device, and a dot-matrix printer, laser printer, or both. We'll keep this information in mind as we try to provide tips and techniques that will work on your particular system.

FINAL COMMENTS

18. Do you read other Cobb Group publications?

Yes: 58% No: 40%

A small number of you indicated that you aren't aware of other Cobb Group publications. Table A shows a partial list of some of our other publications and what percentage of you read them. As you can see, they cover a wide range of software applications. For a comprehensive list, contact Customer Relations at (800) 223-8720.

Finally, many of you made suggestions such as using less computer jargon in our articles, creating a better balance between articles on DOS 5 and those on DOS 6, including coverage of DR-DOS, and providing articles for the computer- or DOS-illiterate. We'll do our best to incorporate as many of these suggestions into the journal as we can. Thanks for your feedback! We look forward to receiving more of it through your letters, faxes, and phone calls. ■

LETTERS

VERSIONS
5.0 & 6.0

What files do you need in the root directory?

I recently read that I can delete the COMMAND.COM file in the DOS directory since it's a duplicate of the COMMAND.COM file in the root directory. Since then, I noticed that the same RESTORE.EXE file exists in both my root directory and my DOS directory. I like to keep my root directory as clean as possible. Can I delete RESTORE.EXE from my root directory? Which files do I need to keep in the root directory?

*Tony Antonico
Manchester, New Hampshire*

When you use DOS 5's BACKUP command to back up files, you must use the RESTORE command to restore them to regular DOS format. Therefore, you need at least one copy of the RESTORE.EXE file on your system. Since it's a good idea to keep the root directory as clean as possible, the best place to keep the RESTORE.EXE file is in the DOS directory with most of DOS' other commands. Remember, however, that if you want to have access to

the RESTORE command (or any other command) from *any* directory, you must make sure your path includes the directory it's stored in. For instance, if RESTORE is in the DOS directory, the PATH command in your AUTOEXEC.BAT file should include the DOS directory:

```
path=c:\dos
```

The only files your root directory can't do without are COMMAND.COM, IO.SYS, and MSDOS.SYS. (IO.SYS and MSDOS.SYS are hidden files and are sometimes called IBMBIO.COM and IBMDOS.COM, respectively.) Your system needs these files before it can carry out any commands.

If you want to tell DOS how to configure your system every time you boot your computer, you must store the CONFIG.SYS file in the root directory as well. If DOS doesn't find CONFIG.SYS in the root directory, it will set up the system with a default configuration.

Microsoft Technical Support (206) 454-2030

2020C:1144914 I:2498222 9411
FRANK RALLY
1796 GRACE AVE
SAN JOSE CA 95125-5620

Finally, if you want to execute a series of commands—such as setting the command prompt, initializing your path, and loading a program—each time you boot, you must include the commands in the AUTOEXEC.BAT file and store this file in the root directory.

XCOPY has its limits

I was trying to transfer files from my old computer's hard drive to a 1.44-Mb floppy disk in the B: drive so I could copy the files to the hard drive of a brand-new PC. I thought about using the BACKUP command to transfer my files, but my old computer uses DOS 5 and the new machine came with DOS 6. Since DOS 6 doesn't provide the BACKUP command, I was afraid I wouldn't be able to decompress my backed-up files. Instead, I tried using XCOPY, but I encountered an unexpected error message. Maybe you can tell me what caused it.

Before starting XCOPY, I initialized the archive bits for the group of files I wanted to copy by issuing the command

```
C:\>attrib +a c:\wp51\docs\*.* /s
```

I then issued the XCOPY command:

```
C:\>xcopy c:\wp51\docs b: /s /m
```

I included the /S switch so DOS would maintain the subdirectory structure as it copied the files, and I added /M so DOS would turn off the archive bits set by the ATTRIB +A command, thereby keeping track of which files it had copied.

DOS appeared to start the copy operation just fine, but after only a few minutes, copying stopped and the following message appeared:

```
File creation error
      224 File(s) copied
```

I don't understand why only 224 files transferred—my C:\WP51\DOCS directory contains 438 files. When I tried re-issuing the XCOPY command, copying again halted prematurely, and DOS displayed the same message. What happened?

Greg Geis
Louisville, Kentucky

Since XCOPY saves you the trouble of restoring compressed files, it's often a good alternative to the BACKUP

command. However, it can't copy more than 224 files at a time. That's why Mr. Geis got the *File creation error* message and DOS copied only 224 of the 438 files in his C:\WP51\DOCS directory. In his case, DOS 5's BACKUP command is a better alternative.

Although DOS 6 replaces the BACKUP command with the MSBACKUP utility, Microsoft had the foresight to keep the RESTORE command in DOS 6. RESTORE allows you to decompress files backed up with DOS 5's BACKUP command and restore those files to a DOS 6 system.

To back up the files in his C:\WP51\DOCS directory, Mr. Geis would issue the command

```
C:\>backup c:\wp51\docs\*.* b: /s
```

Again, the /S switch tells DOS to maintain the subdirectory structure as it compresses the files.

After backing up his files, Mr. Geis needs to create the WP51 and WP51\DOCS directories on the hard drive of his DOS 6 machine by issuing the commands

```
C:\>md wp51
C:\>md wp51\docs
```

Then, Mr. Geis can restore the backed-up files to his machine by placing the backup disk in the appropriate drive and issuing the command

```
C:\>restore b: c:\wp51\docs\*.* /s
```

(assuming he placed the disk in the B: drive). ■

DOS Software Connection

Are you on the lookout for good DOS shareware, freeware, and public domain software? If so, then you may want to subscribe to DOS Software Connection. DOS Software Connection is a service that provides you with a monthly disk loaded with useful DOS utilities, applications, games, and much, much more.

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